

ESDA6V8UD

**4-Lines, Uni-directional, Ultra-low Capacitance
Transient Voltage Suppressors**

<http://www.sh-willsemi.com>

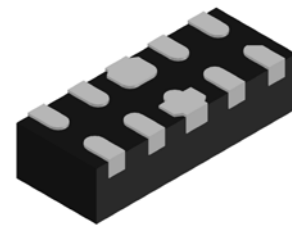
Descriptions

The ESDA6V8UD is an ultra-low capacitance TVS (Transient Voltage Suppressor) array designed to protect high speed data interfaces. It has been specifically designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge).

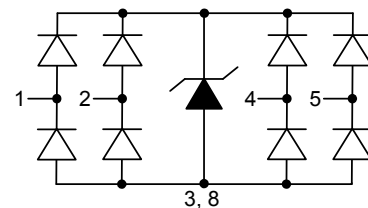
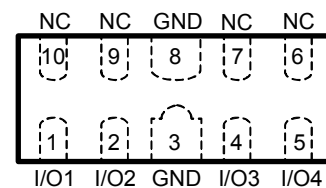
The ESDA6V8UD incorporates four pairs of ultra-low capacitance steering diodes plus a TVS diode.

The ESDA6V8UD may be used to provide ESD protection up to $\pm 20\text{kV}$ (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4A (8/20 μs) according to IEC61000-4-5.

The ESDA6V8UD is available in DFN2510-10L package. Standard products are Pb-free and Halogen-free.



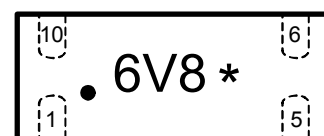
DFN2510-10L (Bottom view)



Pin configuration (Top view)

Features

- Stand-off voltage: 5V max.
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 20\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 4A (8/20 μs)
- Ultra-low capacitance: $C_J = 0.4\text{pF}$ typ.
- Ultra-low leakage current: $I_R < 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 14\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology



6V8 = Device code

* = Month code (A~Z)

Marking & Pin configuration

Applications

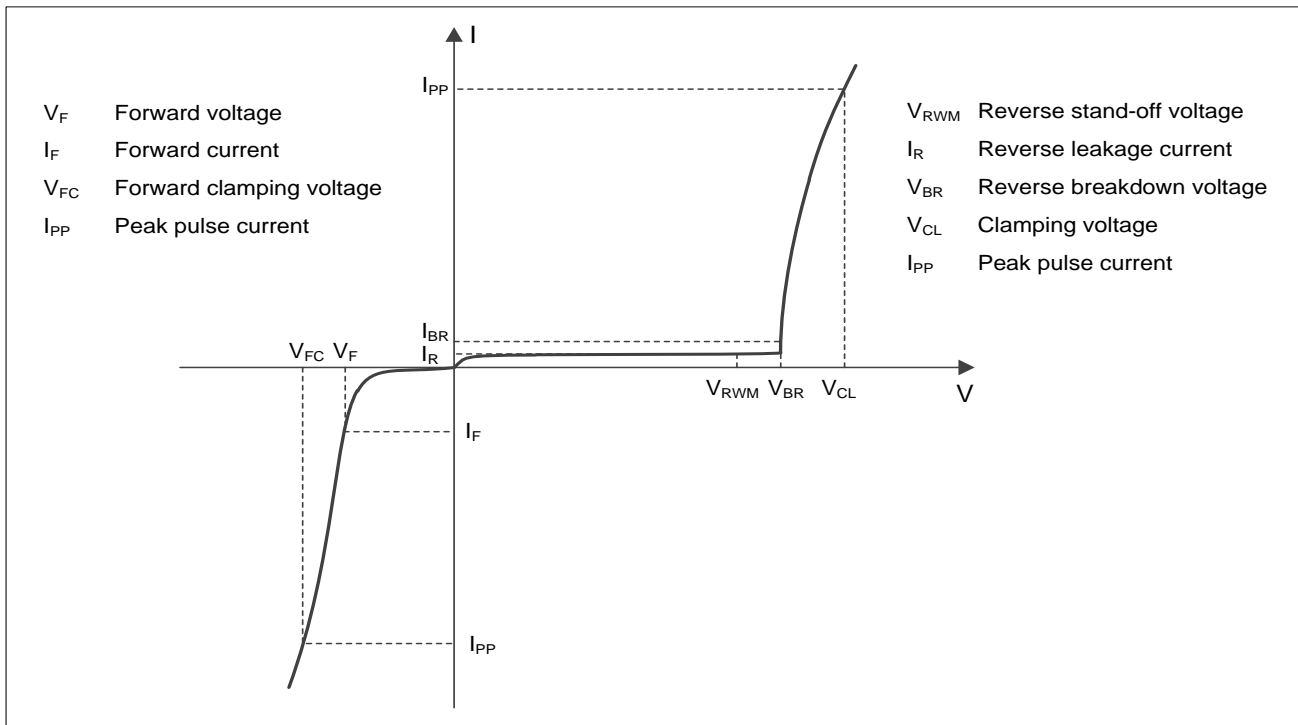
- USB 2.0 and USB 3.0
- HDMI 1.3, HDMI 1.4 and HDMI 2.0
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics and Notebooks

Order information

| Device | Package | Shipping |
|-----------------|-------------|----------------|
| ESDA6V8UD-10/TR | DFN2510-10L | 3000/Tape&Reel |

Absolute maximum ratings

| Parameter | Symbol | Rating | Unit |
|---|-----------|----------|-------------|
| Peak pulse power ($t_p = 8/20\mu s$) | P_{pk} | 48 | W |
| Peak pulse current ($t_p = 8/20\mu s$) | I_{PP} | 4 | A |
| ESD according to IEC61000-4-2 air discharge | V_{ESD} | ± 20 | kV |
| ESD according to IEC61000-4-2 contact discharge | | ± 20 | |
| Junction temperature | T_J | 125 | $^{\circ}C$ |
| Operating temperature | T_{OP} | -40~85 | $^{\circ}C$ |
| Lead temperature | T_L | 260 | $^{\circ}C$ |
| Storage temperature | T_{STG} | -55~150 | $^{\circ}C$ |

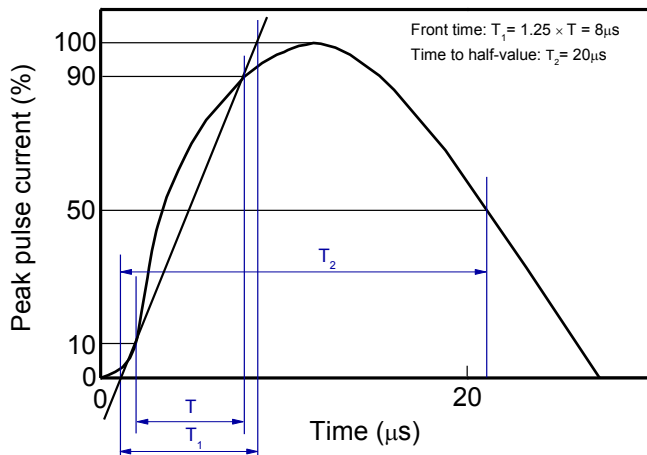
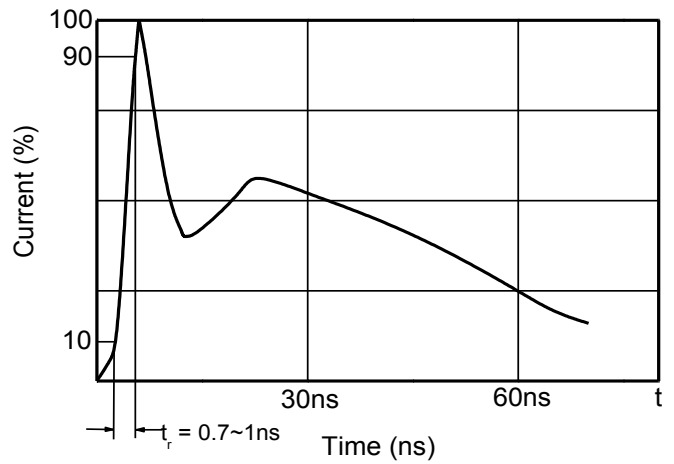
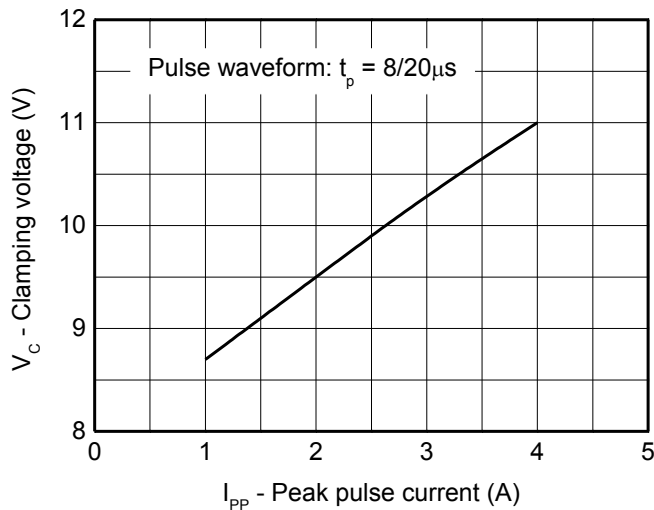
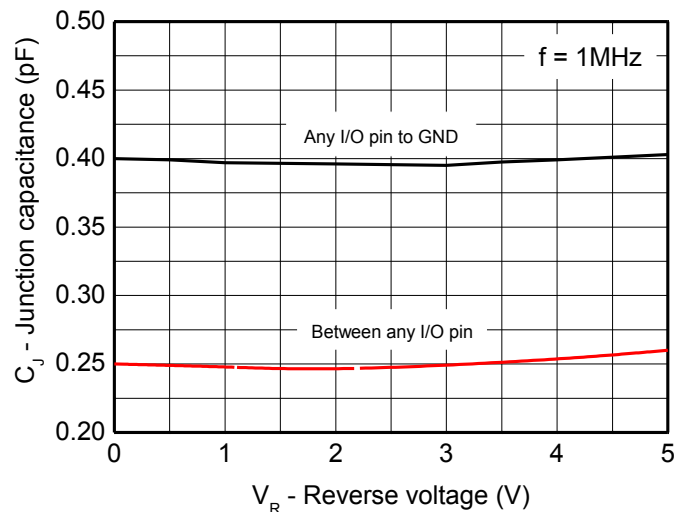
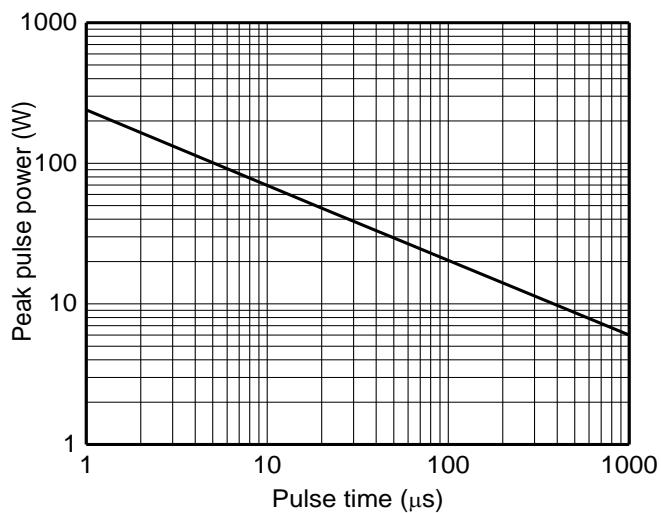
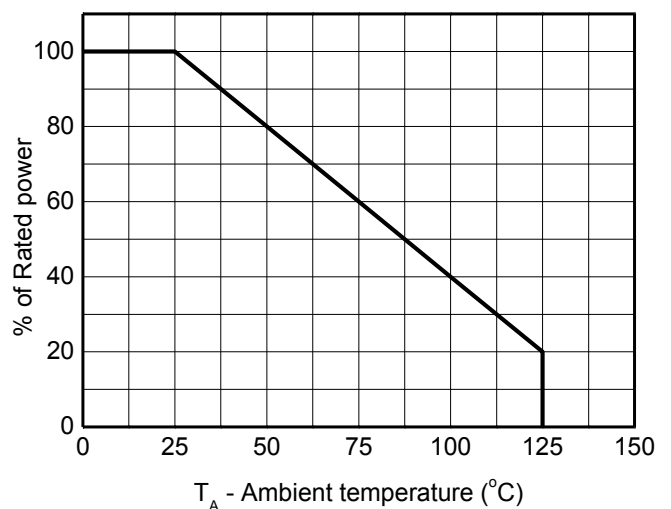
Electrical characteristics ($T_A=25^{\circ}C$, unless otherwise noted)

Definitions of electrical characteristics

Electrical characteristics ($T_A = 25^\circ\text{C}$, unless otherwise noted)

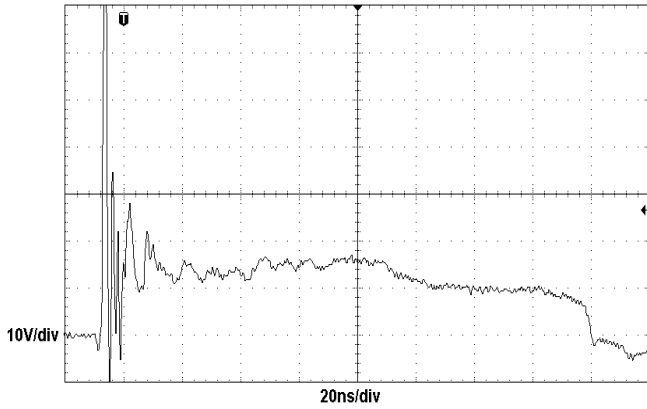
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------|--|------|------|------|----------|
| Reverse maximum working voltage | V_{RWM} | | | | 5.0 | V |
| Reverse leakage current | I_R | $V_{RWM} = 5V$ | | <1 | 100 | nA |
| Reverse breakdown voltage | V_{BR} | $I_T = 1\text{mA}$ | 7.0 | 8.0 | 9.0 | V |
| Forward voltage | V_F | $I_T = 10\text{mA}$ | 0.6 | 0.9 | 1.2 | V |
| Clamping voltage ¹⁾ | V_{CL} | $I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$ | | 14 | | V |
| Dynamic resistance ¹⁾ | R_{DYN} | | | 0.35 | | Ω |
| Clamping voltage ²⁾ | V_{CL} | $V_{ESD} = +8\text{kV}$ | | 15 | | V |
| Clamping voltage ³⁾ | V_{CL} | $I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$ | | | 10 | V |
| | | $I_{PP} = 4\text{A}$, $t_p = 8/20\mu\text{s}$ | | | 12 | V |
| Junction capacitance | C_J | $V_R = 0\text{V}$, $f = 1\text{MHz}$ Any I/O pin to GND | | 0.40 | 0.65 | pF |
| | | $V_R = 0\text{V}$, $f = 1\text{MHz}$ Between any I/O pin | | 0.25 | 0.40 | pF |

Notes:

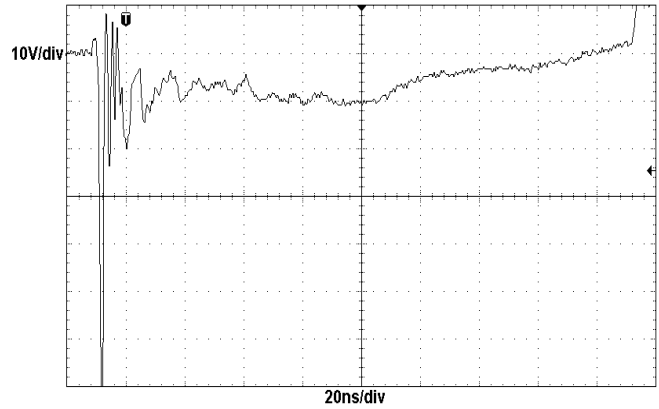
- 1) TLP parameter: $Z_0 = 50\ \Omega$, $t_p = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

Typical characteristics ($T_A = 25^\circ\text{C}$, unless otherwise noted)

8/20 μs waveform per IEC61000-4-5

Contact discharge current waveform per IEC61000-4-2

Clamping voltage vs. Peak pulse current

Capacitance vs. Reverse voltage

Non-repetitive peak pulse power vs. Pulse time

Power derating vs. Ambient temperature

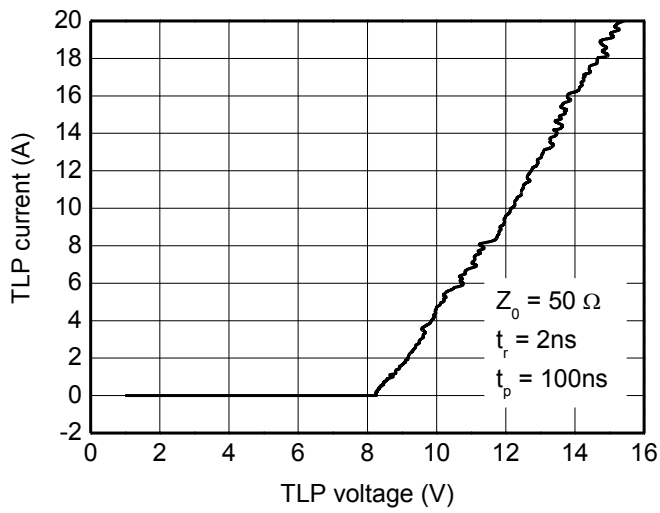
Typical characteristics ($T_A = 25^\circ\text{C}$, unless otherwise noted)



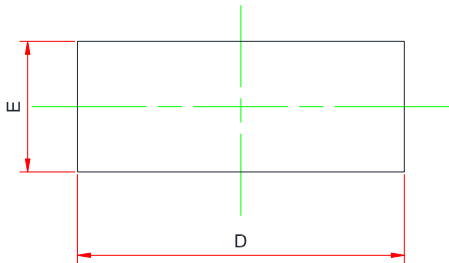
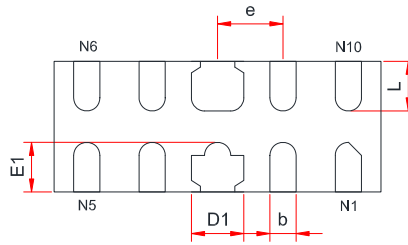
ESD clamping
 (+8kV contact discharge per IEC61000-4-2)



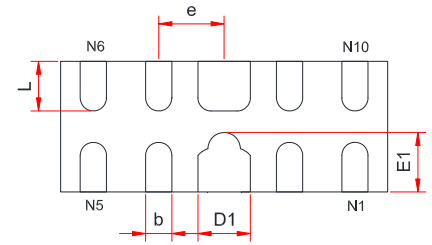
ESD clamping
 (-8kV contact discharge per IEC61000-4-2)



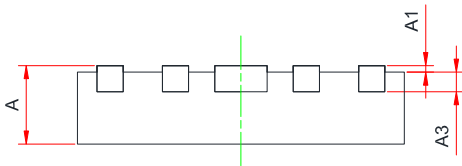
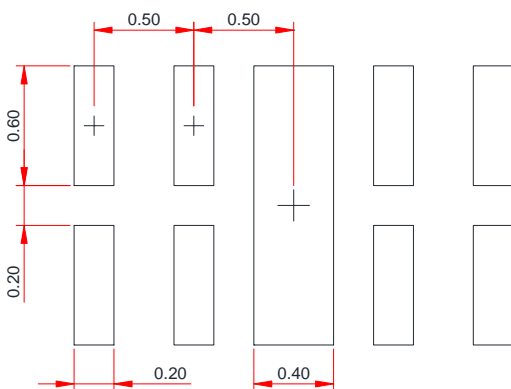
TLP Measurement

Package outline dimensions
DFN2510-10L

Top View


(I)



(II)

Bottom View

Side View
Recommend Land Pattern (Unit: mm)


| Symbol | Dimensions in millimeter | | |
|--------|--------------------------|-------|-------|
| | Min. | Typ. | Max. |
| A | 0.500 | 0.575 | 0.650 |
| A1 | 0.000 | - | 0.050 |
| A3 | 0.150 Ref. | | |
| D | 2.400 | 2.500 | 2.600 |
| E | 0.900 | 1.000 | 1.100 |
| D1 | 0.300 | 0.400 | 0.500 |
| E1 | 0.300 | 0.455 | 0.610 |
| b | 0.130 | 0.200 | 0.250 |
| e | 0.500 BSC | | |
| L | 0.300 | 0.400 | 0.500 |

Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

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